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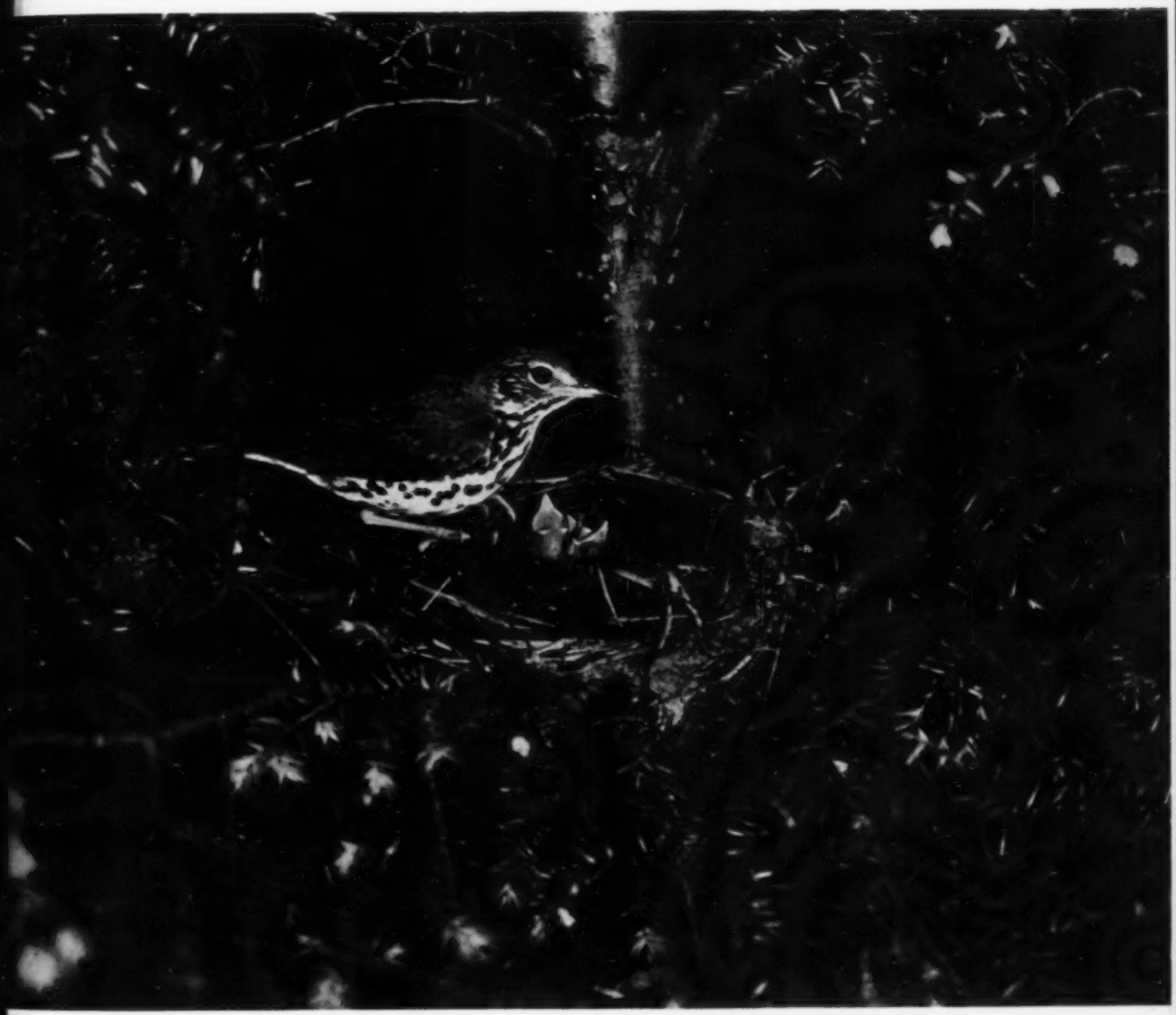

WOOD THRUSH

THE CANADIAN GEOGRAPHICAL SOCIETY

OTTAWA, CANADA

The Society's ambition is to make itself a real force in advancing geographical knowledge, and in disseminating information on the geography, resources and people of Canada. In short, its aim is to make Canada better known to Canadians and to the rest of the world.

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The Society has no political or other sectional associations, and is responsible only to its members. All money received is used in producing the Canadian Geographical Journal and in carrying on such other activities for the advancement of geographical knowledge as funds of the Society may permit.

CANADIAN GEOGRAPHICAL JOURNAL

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This magazine is dedicated to the interpretation, in authentic and popular form, with extensive illustrations, of geography in its widest sense, first of Canada, then of the rest of the British Commonwealth and other parts of the world in which Canada has special interest.

The articles in this Journal are indexed in the *Reader's Guide to Periodical Literature* and the *Canadian Periodical Index* which may be found in any public library.

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Colour photograph by W. V. Crich

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The Great Divide

by ROBERT J. C. STEAD — *Photographs *by* GORDON M. DALLYN

*With exception of the Banff series, all photographs taken from the train while in motion.

BETWEEN LAKE LOUISE, Alberta, and Field, British Columbia, is the Great Divide—the place at which the drainage systems of the Pacific and the Atlantic Oceans meet. It also is the boundary between the Provinces of Alberta and British Columbia, and marks the central core of the Rocky Mountain Range, aptly called the backbone of the continent. Here the mountain drainage divides into two streamlets. The water in the eastern stream flows by the Bow, Saskatchewan, and Nelson Rivers into Hudson Bay. That in the western by the Kicking Horse and Columbia into the Pacific Ocean. The surrounding region of mountains, lakes, glaciers and rivers is among the most spectacular in America, if not in the world.

For a thousand miles the west-bound passenger, whether by train or motor car, has been making the gradual ascent which culminates at the Great Divide. Interruptions have occurred in that ascent, notably at Winnipeg, where the Red River winds northward through the first of the prairie plains, and at Medicine Hat, where the South Saskatchewan River has cut a deep valley 250 feet below the surrounding country, but the

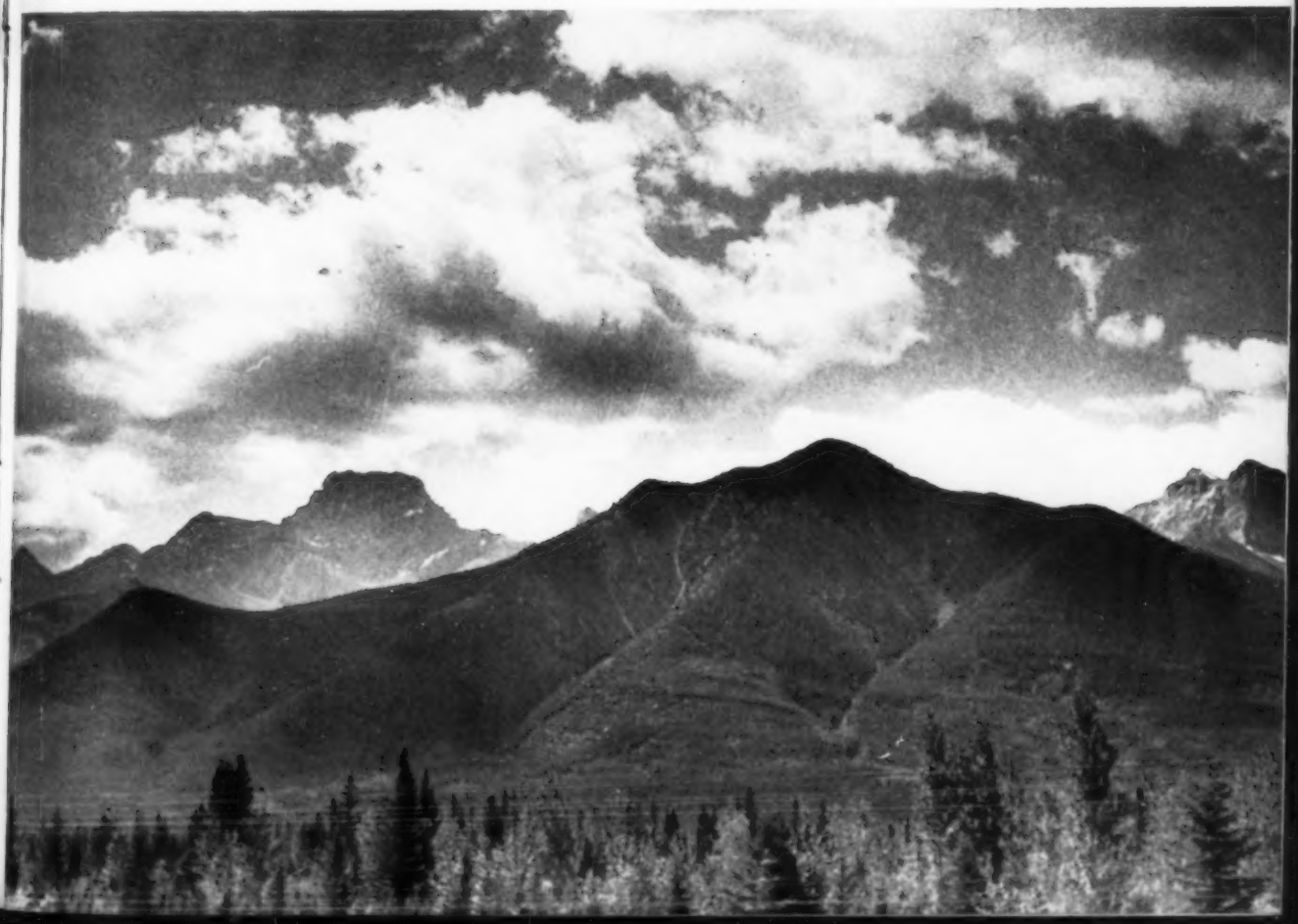
At top:—Approaching the Rocky Mountains. View from Seebe looking west to Exshaw and The Gap; section of the highway and Bow River in the foreground.

general trend has been always upwards. From Medicine Hat to Calgary is a climb of 1,317 feet; from Calgary to Banff, 1,036 feet; from Banff to the Great Divide, highest point on the Canadian Pacific Railway, 803 feet. Then, upon entering the Pacific slope, comes an almost precipitous drop of 1,265 feet in less than 15 miles. Such is the profile across the Great Divide; a very gradual ascent from the east and, on the west, a precipitous drop presenting huge problems to the railway, and, in lesser degree, to the highway.

About sixty miles east of Calgary the distant range of the Rockies comes into view hanging like a low cloud on the western horizon. The cloud grows as the traveller advances across the prairies, and gradually consolidates into a solid, glistening mass, saw-toothed against the western sky. At Calgary, highway and railway both seek the easy ascent afforded by the valley of the Bow River, and the foothills on either side for a time cut the mountains from view. This part of the trip is, however, one of great scenic charm. The railway closely parallels the river, often within a few feet of its blue-green waters; the highway, which can be more indifferent to sudden ascents, follows the same general course but occasionally cuts over the shoulder of a foothill, commanding a sudden pre-view of the grandeur of the Rockies, before dropping again to the river level. Herds of cattle browse on the valley pastures, and shaggy patches of timber cling to the northern slopes of the hills. Hydro-electric works along the Bow serve as reminders that the majesty of nature is no barrier to the utilitarian hand of man, and broad, smooth scars against the hillside indicate the removal of rock for the manufacture of cement.

Entry into the actual mountain area is made at a point appropriately called The Gap, 62 miles west of Calgary. Here the mountains, so long partially concealed by

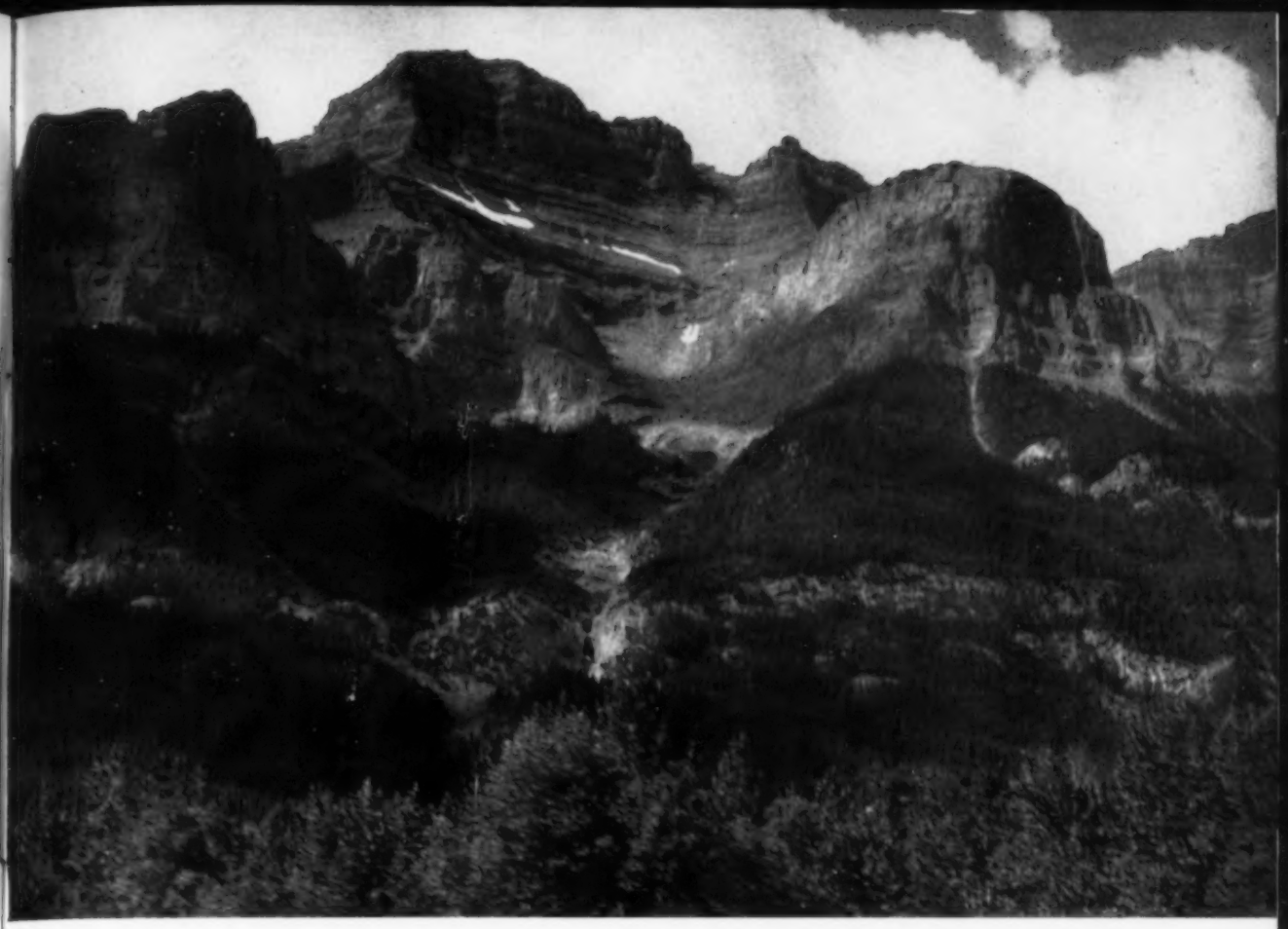
Looking southwest across Bow River valley from near Exshaw with Mount Lougheed (10,190 feet elevation) in the background. At Exshaw limestone is quarried in the mountainside for the manufacture of cement.



Left:—Rounding a bend, looking north from a point between The Gap and Canmore.

Below:—Viewed from railway near Canmore, left to right: Chinaman's Peak, Whiteman's Pass and the eastern end of Mount Rundle.

Right page:—A closer view of Mount Rundle and its forest-clad slopes, as seen from near Canmore. At Canmore seams of bituminous coal are being mined.



the foothills, bear down upon the river; Fairholme Range on the north; Pigeon Mountain, Wind Mountain, and the Three Sisters on the south. The highest peak of the Three Sisters reaches an altitude of 9,744 feet, and although there are much higher peaks farther on, the sudden plunge at The Gap from foothills into mountains is one of the impressive features of a trip across the Great Divide. Another few miles and the aesthetic and the utilitarian again link hands at the coal mines of Canmore, with the majestic Fairholme Range looking down from the east.

The first impression created by the mountains is one of awe, produced not so much by their bulk or height as by an effort to contemplate the immeasurable force needed to raise these mountains. Once they were ocean beds below sea-level. Now they reach to altitudes almost two miles high. The bald sides of the mountains expose the various rock formations marking different geological eras. Geologists give the Rockies an age of about half a billion years, "involving the accumulation of great thicknesses of sediment, their upheaval, and the erosion of the uplifted masses into their present forms. Both mountain ranges (the Rockies and the Selkirks) consist largely of rocks that were laid down originally as sand, mud, and calcareous ooze in a more or less horizontal position in a broad inland sea that stretched from what is now California to the Arctic, occupying roughly the area where the mountains now stand. As the sea-bottom gradually subsided, bed after bed was added, one on top of the other, the character of the sediment and the thickness of the bed deposited at any one locality being controlled by the distance from the shore, the depth of the water, and the nature of the contributing agencies. As the sediments were being laid down, there was buried with them the remains of plant and animal life that existed at that time. Some

VIEWS FROM BANFF SPRINGS GOLF COURSE.

Right:—Cascade Mountain (9,840 feet), overlooking the Palliser Range.

Two views of Tunnel Mountain, where Bow River swirls by its base a short distance east of Bow Falls.

Left:—South face

Right page:—East face

The Palliser Range, on the east side of Cascade Valley, showing the west face of Mount Inglismaldie (9,715 feet), Mount Girouard (9,825 feet), centre peak, and on extreme right Mount Peechee (9,625 feet).

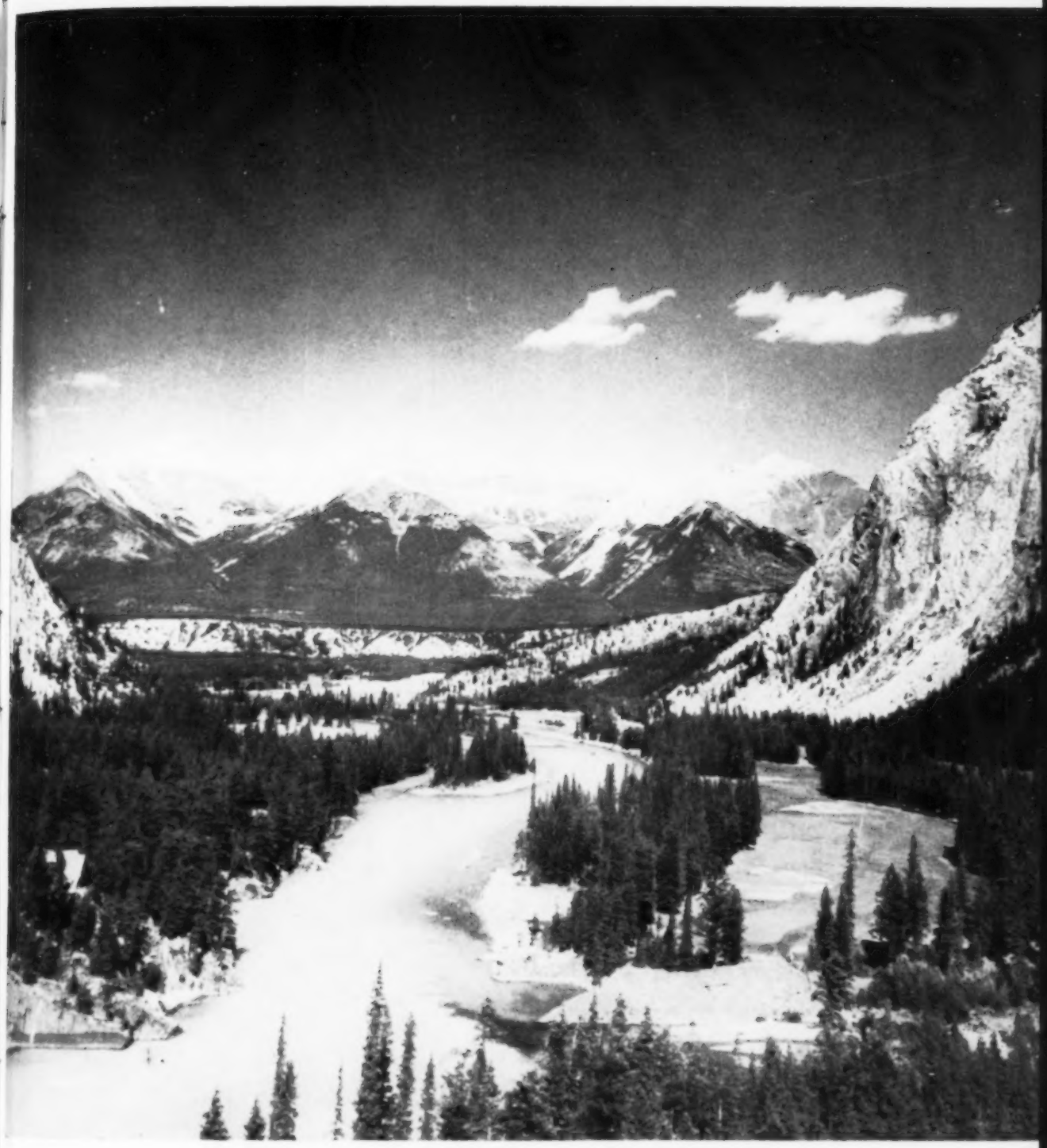
of these were destined to be preserved and to contribute to a record of the gradual development of life upon the earth; in some beds the fossil content is meagre, and in others relatively abundant. . . . During successive geological ages the sea-bottom and foreshore on the west were raised above sea-level. . . . During the hundreds of millions of years that elapsed there were many oscillations of the sea-level. . . . As the compressive forces directed from the west progressively increased through the settling of the large Pacific segment of the earth's crust, the uplifted areas gradually became arched upward, and folded, or broke into large blocks which were tilted and thrust one over the other to the east. It was this chain of events that produced the folded and faulted mountains of the Selkirks and the Rockies."*

At a point approximately 74 miles west of Calgary, railway and highway enter Banff National Park, oldest national park in Canada, attracting the greatest number of visitors. Its reservation as a park was due originally to the discovery of medicinal hot springs at Banff, and as the scenic magnificence of the area became more generally appreciated the size of the park was extended from the original ten square miles to its present 2,585 square miles. The administrative headquarters are in the town of Banff, a mountain resort of world-wide fame. Nearby on the north side of Bow River is Tunnel Mountain with Stoney Squaw Mountain and Cascade Range beyond. To the east is Mount Rundle and to the west Sulphur Mountain and a sea of mountains too numerous to be individually mentioned. Mount Rundle warrants reference as having been named after Rev. R. T. Rundle, first Protestant missionary in the area, who

*Geology of the National Parks of Canada, by B. R. MacKay, *Canadian Geographical Journal*, February 1940

MEDITATION

Bow Falls opposite the junction of Bow River and Spray River



View from Banff Springs Hotel at the junction of Bow River and Spray River, looking northeasterly down the Bow River. The valley cuts through limestones and shales of Carboniferous age. In the background are Fairholme Mountains whose highest peak, Mount Inglismaldie (on left) is 9,715 feet above sea-level. On the right centre is the north shoulder of Mount Rundle, which rises to an elevation of 9,665 feet; on the left the slope of Tunnel Mountain, which has an elevation of 5,540 feet. A 50-foot-high terrace of silt and gravel is to be seen in the lower background where Bow River turns sharply to the south and pursues a southeasterly course along the broad Cascade Valley cut in softer Mesozoic strata in which occur the coal deposits of Anthracite and Canmore.

South end of Cascade Mountain and west slope of Stoney Squaw as viewed from south side of Bow River valley at Banff.

camped in its shelter in 1841. Tunnel Mountain owes its name to the fact that at one time it was planned to drive a tunnel through it for the railway. A more favourable route was found, but the mountain retained its name.

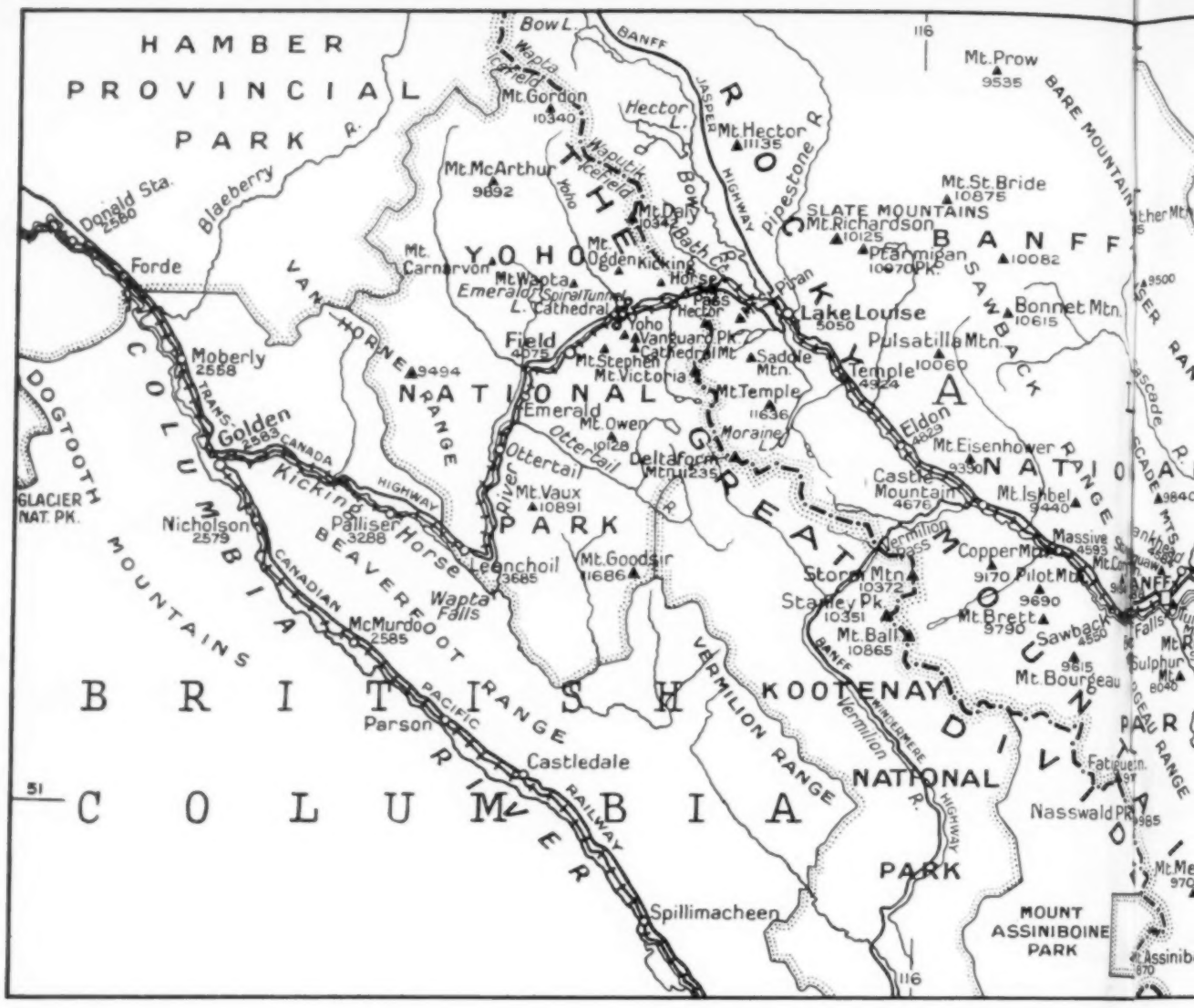
The town of Banff is built on level valley-land skirted by the Bow River. It contains numerous business places, hotels, and private residences, as well as schools, churches, and similar institutions. A short distance away, facing Bow Falls, is Banff Springs Hotel, owned by the Canadian Pacific Railway. Many auto courts and campgrounds also cater to a stream of tourists which flows the year around but reaches flood-tide during the midsummer holidays.

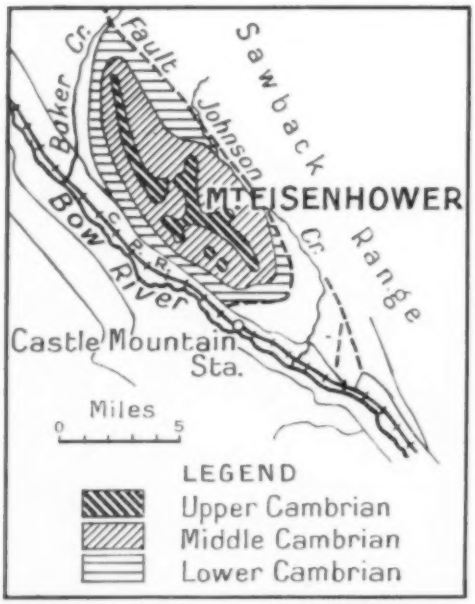
West of Banff, highway and railway continue their courses along the almost level valley of the Bow. First visitors always comment upon this singularly easy route which penetrates into the very heart of the Rockies without a single tunnel or other difficult engineering problem. But, as we shall see, full payment is made for these advantages after we pass the Great Divide.

Both sides of this level valley are guarded by mountains, with peaks 9,000 to 11,000 feet or more above sea-level. Most notable of them, because of its association with a great general, is Mount Eisenhower, so named by Prime Minister King as a compliment to General Eisenhower when he visited Ottawa after the conclusion of World War II. Before that it was known as Castle Mountain, a name very readily suggested by its castellated appearance. The height of Mount Eisenhower is 9,390 feet. Other mountains with elevations of more than 9,000 feet in the Banff—Lake Louise

West slope of Mount Rundle formed by carboniferous limestone which dips southwesterly and forms the eastern slope of Spray River valley.

View from Banff Station:—In the background, Bourgeau Range and Mount Bourgeau (9,575 feet); in the foreground, the north shoulder of Sulphur Mountain. On the east slope of Sulphur Mountain are situated the hot sulphur springs.

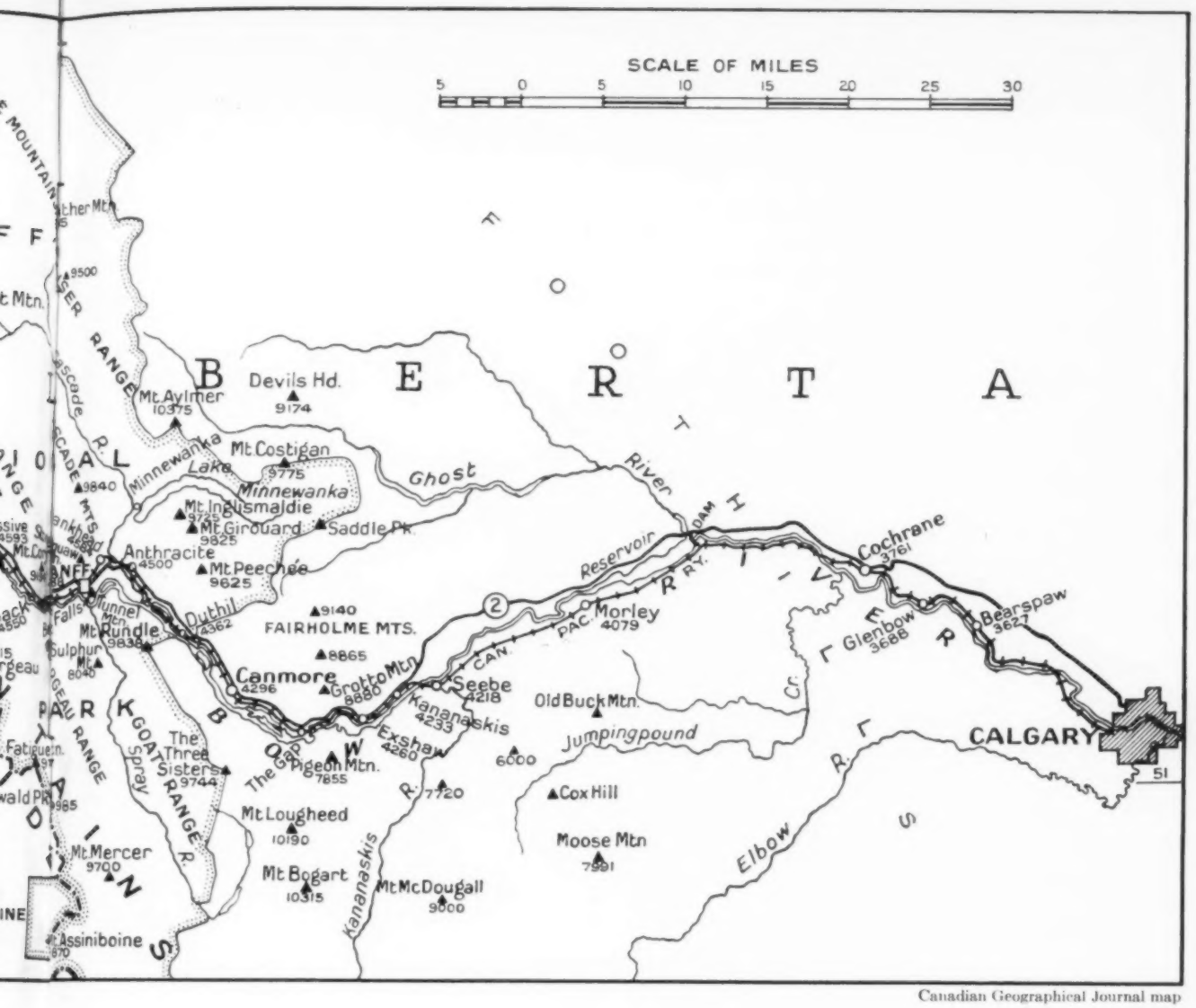




C.G.J. chart

Left:—"The upper slopes (of Mount Eisenhower) are Cambrian. It is capped by the thin-bedded red-weathering limestones and shales of the Bosworth formation (Upper Cambrian). The perpendicular cliffs at the top represent the Eldon formation. This is the type locality and this formation has a measured thickness of 2,728 feet (832 m.). The Stephen formation is about 600 feet (183 m.) thick, and forms a very flat talus-covered slope, while the Cathedral formation below is about 1,500 feet (458 m.) thick and forms a precipitous slope. These three formations are Middle Cambrian in age. The Lower Cambrian beds are largely quartzitic and form brush-covered, irregular slopes."

From *Guide Book No. 8* (1913), issued by the Geological Survey, Dept. of Mines, Ottawa.



Canadian Geographical Journal map

region include Sawback Range, Mount Bourgeau, Mount Cory, Mount Ishbel, Mount Brett, Pilot Mountain, Mount Ball, Copper Mountain, Storm Mountain, Mount Deltaform, Mount Temple, Ptarmigan Peak, and Mount Hector. Truly the battlements of the Rockies stand guard over the entrance to the Great Divide.

Thirty-six miles west of Banff and 516 feet higher in altitude is Lake Louise Station. Here is the junction of the Trans-Canada

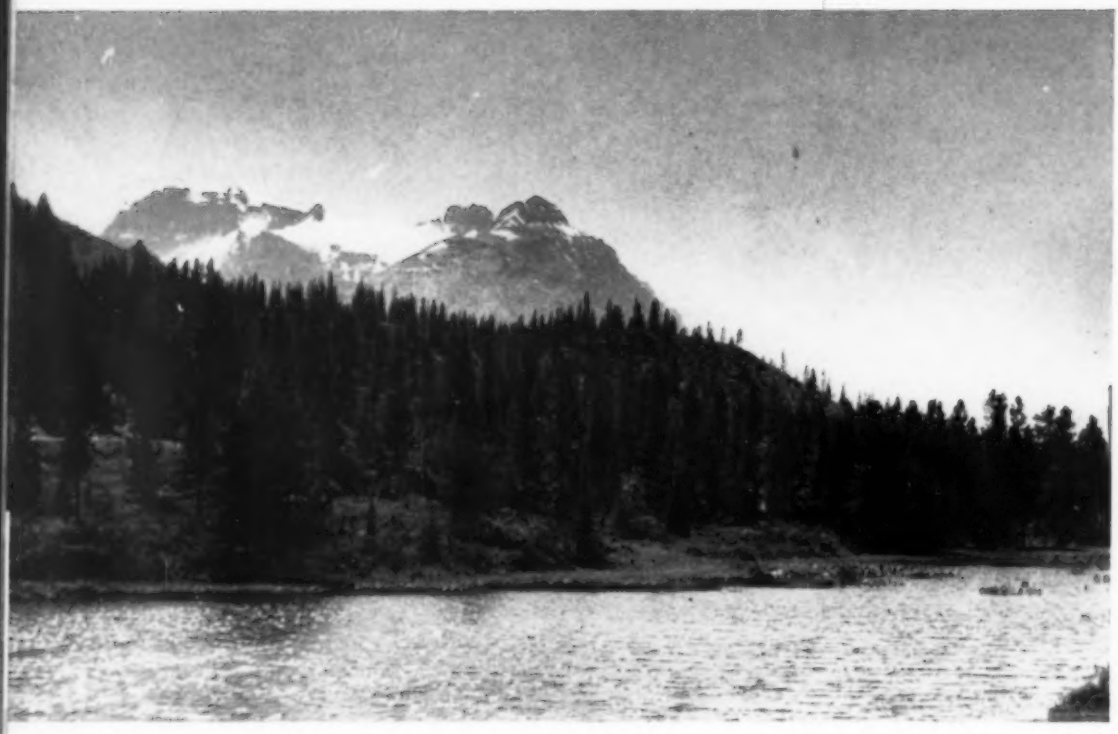
Mount Stephen as it appears immediately east of Field.

Where the western shoulder of Mount Eisenhower, with its castellated limestone cliffs, looks down on Baker Creek. This mighty mountain dominates the scene for over ten miles along the north-eastern border of the Bow River valley.

View from Sink Lake near the Great Divide, in the Province of British Columbia. In the distance Victoria Glacier with Pope's Peak in the background; on the extreme right, Maroa Peak.

Mount Temple (11,634 feet), the highest peak in this part of the Rocky Mountains, as it appears from Lake Louise Station about six miles north; to the right stands Saddle Mountain.

Looking northwest up Bath Creek to Waputik Peak, from the railway, about four miles west of Lake Louise Station.



Top:—Distant view of Cathedral Mountain and Vanguard Peak. Below:—Cathedral Mountain viewed from Kicking Horse Pass, showing cathedral crags and precipitous quartzite cliffs of Mount St. Piran.

View from west of Lake Louise Station looking southwest towards Mount Niblock (9,764 feet) in the background, with Mount St. Piran (8,691 feet) on the east side.

Looking north across Kicking Horse River valley east of Field, showing icefield and glaciers.

Highway with the Banff-Jasper Highway, a scenic route leading northwestward to Jasper National Park. The station is noted principally, however, as the stopping-off point for Lake Louise, some three miles away and 630 feet still higher in the mountains. The praises of Lake Louise, its magnificent colourings reflecting the surrounding mountains and the blue-white ice of Victoria Glacier, have been sounded wherever world travellers foregather.

Six miles west of Lake Louise Station is the crest of the Great Divide, 5,338 feet above sea-level, marked by a huge rustic arch connecting the Provinces of Alberta and British Columbia and indicating the exact location of the Divide. Here the easy inclines which have marked the route all the way from the prairies come to an abrupt termination. Here we prepare to enter the Kicking Horse Pass, so named from the misbehaviour of a horse in the early exploration days. Mount Niblock, Mount Bosworth, Mount Daly, Cathedral Mountain and Mount Stephen, all more than 9,000 feet high, are the principal guardians of the Pass, along which the infant Kicking Horse River tumbles its way down to the town of Field, more than 1,200 feet below. It was this immense barrier which was the greatest obstacle to the building of a railway connecting the prairies with the Pacific Coast. For a time it seemed that the whole enterprise might be blocked by the impassable precipices rising from Field to the Great Divide. When a line was finally driven through, its gradients were so steep that three engines were needed to move a train of eight passenger cars over it from west to east. Eventually this difficulty was overcome by the building of two tunnels with a combined length of more than 6,000 feet which enter Cathedral Mountain and Mount Ogden and make an almost complete circle in each—hence called the Spiral Tunnels—thus lengthening the route and reducing the gradient. The abandoned roadbed, climbing over the mountainside, is now used as part of the Trans-Canada Highway. It commands views in which the engineering skill of man competes with the marvels of nature in fascinating attention. Field is a railway town of some importance located in an expansion of the valley of the Kicking Horse River. It is also administration headquarters for Yoho and Kootenay National Parks, which adjoin Banff National Park on the western side of the Great Divide. Yoho, 507 square miles, contains some of the most spectacular scenery in the Canadian Rockies, and Kootenay National Park, 587 square miles, affords unbroken parkway connection between the hot springs at Banff, Alberta, and those at Radium Hot Springs, British Columbia. From Field westward the altitudes drop another 1,500 feet in the 35 miles to Golden, where the Kicking Horse River enters the Columbia and the western slopes of the Great Divide come to an end.

The Great Divide is not merely one of the outstanding physical features of Canada; it is an area of awe-inspiring beauty, a concentration of many of the greatest mountains in the Canadian Rockies, and the locale of historic adventures having to do with the development of the Dominion. The Kicking Horse Pass, with which it is associated, was explored by Dr. Sir James Hector, a member of the Palliser Expedition, in 1858. It was Dr. Hector who was kicked by the horse, and who gave the pass its name in honour of that event. Dr. Hector's own name is commemorated in Hector Railway Station, not far west of the Great Divide, Hector Mountain, Hector Lake and Hector Pass. The Bow River, which provides the entrance to the pass from the east, is believed to have been first explored by David Thompson in 1801. At the Great Divide one enters an entirely different climatic area, with greater precipitation, heavier timber, and a mildness which increases until it culminates in the salubrious climate of the Pacific Coast. To the geologist the area is one of unsurpassed interest. It was Dr. MacKay, already quoted, who said: "The Canadian mountains . . . possess a charm in extensive ice-fields, glistening glaciers and snow-capped peaks, the like of which can be seen neither in Switzerland nor the United States."

Bordering the railway, mile upon mile, between Banff and Lake Louise, the mountain scene unfolds in glimpses of rushing waters, bordered by evergreens, forest-clad mountainsides, and towering mountain ranges.

East of Field looking north across the gorge where the highway bridge spans Kicking Horse River beneath the steep sides of Mount Field.

Right page bottom:—
Looking west from near Hector station, across Wapta Lake and Kicking Horse River valley to Mount Wapta in the distance.

Kicking Horse Valley near Field, British Columbia.

Over One Million Geological Specimens

by A. J. BUTLER

Assistant Curator, Geological Museum, London

In 1935 geologists from all over the world gathered in London to celebrate the centenary of the Geological Survey of Britain, and to attend the opening of a new Geological Survey and Museum building in South Kensington, London. The Geological Survey and the Geological Museum are the two parts of a single organization. The Geological Survey is responsible for investigating the mineral resources of Britain and for the preparation of geological maps of the whole country. The Geological Museum, or Museum of Practical Geology, has the duty of preserving the collections made by the geological surveyors in the course of their work, and of demonstrating to the public the principles of geological science and its practical value.

From 1935 to 1939 the new Museum attracted an increasing stream of visitors but at the outbreak of World War II the public galleries were closed and converted into offices for the London Civil Defence authorities. All the exhibits were dismantled and stored, and the most valuable were removed to a place of safety in north Wales.

At top:—The rotating relief globe, coloured to show the geology of the world, in the main hall of the Museum.

The building remained throughout the war the headquarters of the Geological Survey staff, who were busily engaged on industrial and military geology. During enemy attacks from the air one bomb struck the building, and many other bombs and rockets fell near, but although there was much minor damage the main structure of the building remained intact.

Since the end of the war the staff has been working on the restoration of the Museum. On September 18, 1946, it was once again opened to the public, and by the end of the year visitors were numbered in tens of thousands. The Museum consists of a main hall and two surrounding galleries, lit by a glass roof and by large side windows with a total exhibition area of over 54,000 square feet. The hall, entered by a staircase lined with British marble of great beauty and variety of colour and pattern, is devoted to exhibits designed to interest and instruct the non-technical public. The most striking single feature is a unique rotating model of the earth, six feet in diameter, with mountain structures modelled in relief upon its surface. This globe is painted in brilliant colours to show the distribution of rock formations throughout the world.

The central part of the main hall is occupied by an extensive collection of precious, semi-precious and ornamental stones. They are displayed in special cases fitted with curved glass panels which eliminate reflections and allow the full beauty of the stones to be clearly seen. Valuable diamonds, rubies, sapphires and emeralds, topaz, zircon, tourmaline and jade, opal, agate and onyx, and amber, gypsum and alabaster are on view. Both uncut and cut or carved specimens of each stone are shown. At one end of this floor stands a great ten-ton statue of Hercules, executed in a single block of the famous Portland stone of which so much of London is built.

Around this main hall are some of the Museum's most attractive features, illuminated dioramas showing scenes of geological interest in the present and in the past. Each is a combination of perspective relief model and a curved painted background, set in a mahogany case and viewed through a plate glass window measuring about seven by three feet. Much labour and artistry have gone into the making of these dioramas. The variety of topics they illustrate may be indicated by some examples:

Vesuvius in Eruption. This is a reconstruction of the great eruption of the Italian volcano in 1872, when the explosion cloud of rock and dust reached a height of nine miles. It is fitted with mechanism which simulates the flame and flicker of the fiery crater and of the white hot lava-flows on the flanks of the volcano.

Early Man in the Thames Valley. Early stone age man and the early elephant, rhinoceros, horse and boar are shown in the woodlands which 100,000 years ago occupied what is now the London area.

A Primeval Coal Forest. A reconstruction of a scene some two hundred million years ago when rank vegetation flourished in humid swamps and its remains accumulated in layers from which the coal-seams of Britain were formed.

The Whitehaven Coalfield. A scene in a coalfield in northwest England, with the foreground cut away so that the underground structure of the seams and the method of working them can be seen.

Penrhyn (Wales) Slate Quarry. A model of one of the greatest slate quarries in the world. The railway tracks within it total fifty miles in length.

Around the sides of the main hall are exhibits which teach the simple principles of geology—the nature of rocks and of the earth's interior; how granite and volcanic lavas were formed from molten rock ex-

The Geological Museum building from Exhibition Road, London.

An illuminated diorama of the Dawes Glacier in Alaska.

pressed from deep in the earth's crust; the way in which stratified rocks were deposited as sand and mud and lime on the beds of ancient seas and lakes; how such deposits, entombing the fossil relics of animal and plant life, were hardened, compressed and folded, and raised to form dry land; and how the work of rain, rivers, sea and glaciers has sculptured from them the present hills and valleys of Britain.

All this is shown by carefully selected specimens with printed descriptive labels; by large coloured maps and diagrams; and last, but very important, by hundreds of photograpic enlargements chosen from the 13,000 photographs of British scenery which the Geological Survey has taken in the course of its work.

The first gallery of the Museum is devoted to exposition of the systematic geology of Britain. The country is dealt with in eighteen separate regions, each a geographical unit. A visitor may come from the Highlands of Scotland, the coalfields of South Wales, the granite moors of Cornwall, or the chalk hills of southeastern England. He can readily find his way to cases in which the geology of his home district is explained by maps, specimens of rocks and fossils, diagrams, labels and large photographs, and by coloured relief models.

The second public gallery of the Museum is more technical in nature. It is devoted to economic geology and mineralogy, and the exhibits include specimens from the principal mineral deposits of the whole

Left:—
Diorama of Lake Shore Gold Mine, Ontario. The ground is represented as cut away in a section passing through the mine shafts, illustrating the geological structure to a depth of 4,500 feet. The gold-bearing veins are shown as thin white lines in the neighbourhood of the shafts. The dark coloured parts of the sections are rocks of sedimentary origin, and the igneous rocks which were intruded into the sedimentary rocks are shown by the light colouring.

Diorama showing the explosive eruption of Vesuvius in 1872. The dense explosion cloud charged with pulverized rock and volcanic dust was over nine miles high. Streams of slowly moving lava are shown flowing down the flanks of the mountain.

world. There are displayed the ores of precious metals—gold, silver and platinum; and the ores of the base metals—iron, copper, lead, tin and zinc.

In all, the collections of the Geological Survey and Museum include over one million specimens. Among them are 550,000 registered and indexed fossils, and 75,000 sections of rocks ground to transparence for microscopical examination. There is also a comprehensive reference library containing some 75,000 geological books and pamphlets and over 25,000 maps.

A special temporary exhibit in the Museum shows examples of the war-time work of British geologists. This was of two main kinds. Work within the United Kingdom included intensive search and survey for additional supplies of coal, metals and many other minerals essential to the prosecution of the war, which included mica, fluorspar and pure sand for optical glass; the survey and development of underground water supplies for new factories, camps and airfields; and work on the construction of underground factories, ammunition stores and fortifications.

The other group of work related to the planning and conduct of military operations overseas. The exhibit shows maps of enemy-occupied territory made by geologists during the planning of each major operation—the North African campaign, the invasions of Sicily and Italy and finally the invasion of Western Europe. These maps predicted the best landing beaches, the routes on which tanks would be safe from bogging, the areas suitable for construction of airfields, trenches and camps, the sources of rock for airfield and road repair and the areas where adequate water for the armies could be quickly obtained by boring. Geologists also accompanied the armies in the field. Examples are shown of the value of their service throughout the war, ranging from vital work on water supply for troops in the North African desert to the choice of routes for the final crossing of the Rhine in 1945.

Similar geological work was done by the enemy, and some of the military-geological maps prepared by the Germans are also exhibited in the Museum. Of special interest to Londoners is a map of the southeast of England. This was completed by German geologists in June 1940 in preparation for the projected invasion of the British Isles which defeat of the Luftwaffe by the Royal Air Force caused Hitler to postpone, and finally to abandon.

A painting showing the landscape of southeast England some hundred million years ago, with sub-tropical vegetation and a variety of huge reptiles.

The Geological Society of America

Photos Capital Press Service, Ottawa

DURING THE WEEK between Christmas and New Year, December 28 to 31, 1947, there met at the Chateau Laurier, Ottawa, a distinguished concourse of scientists. The occasion was the 60th Annual Meeting of the Geological Society of America; a number of associated organizations also held their meetings at the same time: the Paleontological Society, its 39th meeting; the Mineralogical Society of America, its 28th meeting; the Society of Economic Geologists, its 28th meeting; the Society of Vertebrate Paleontologists, its 7th meeting; and the Geological Association of Canada, its 1st annual meeting. The registration for the meetings was over nine hundred of whom five hundred and forty-seven were from across the border.

There was a very definite reason for the geologists of the continent to meet in Ottawa at this particular time. They came on the invitation of the Geological Survey of Canada, an organization which was celebrating its 105th anniversary. It had been founded in 1842 by William E. (later Sir William) Logan, a geologist of international fame, and its services to Canada and to geology have been continuous since that date. It had been planned that the Ottawa meeting of the Geological Society and its associated bodies should have been held in 1942, the centennial year of the founding of the Geological Survey. An invitation was

At top:—The sixtieth annual dinner of the Geological Society of America, held in Ottawa on December 30, 1947.

sent for that year and was accepted by the Geological Society but later owing to the stress of war conditions the meeting had to be cancelled. The Survey later renewed its invitation for the year 1947, its 105th anniversary. Its members acted as hosts for the visitors.

The three days were fully occupied. Over 200 scientific papers were presented or read by title. Aside from the first morning when all the societies met together there was a series of meetings (as many as six) running concurrently. Among the subjects discussed at considerable length may be mentioned: the origin of granite, techniques in invertebrate paleontology, stratigraphic nomenclature, problems of geochemistry, the geophysical study of the continents, Russian geological literature, geologic education, problems in paleontology.

The visitors were welcomed at the opening session by the Honourable J. Allison Glen, Minister of Mines and Resources, in the Chateau Ballroom. Three presidential addresses followed: Dr. Martin J. Buerger, Retiring President of the Mineralogical Society, spoke on "Role of temperature in geology"; Dr. R. C. Moore of the University of Kansas, Retiring President of the Paleontological Society, on "Stratigraphical Paleontology"; and Dr. Chester Stock of the California Institute of Technology, Pasadena, Retiring President of the Society of Vertebrate Paleontologists, on "Pushing back the history of land mammals in western North America". The president of the Society of Economic Geologists, Dr. Geo. H. Ashley, delivered his presidential address at the annual luncheon of that society. Following the luncheon the Roebling Medal was presented to Dr. Paul Niggli, of the University of Zurich, Switzerland.

Monday evening, the 29th, a Social Evening was held at the National Museum and National Gallery of Canada. The highlight of this was the address by the retiring president of the Society, Dean A. I. Levorsen of Stanford University, California, on "Our Petroleum Resources". Following the address there was music led by the Gatineau Troubadours, motion pictures in technicolour showing scenes in various parts of Canada, and refreshments.

An interesting feature in connection with this function was that the two front rows of central seats were reserved for senior geologists noted for their contributions to science. Among these may be mentioned Dr. Bailey Willis of California, aged 90; Dr. J. B. Tyrrell, Toronto, 89; Dr. Andrew Lawson, California, 86; Dr. Alfred C. Lane, Massachusetts, 85; Dr. W. H. Hobbs, Michigan, 83; Dr. Geo. H. Ashley, Pennsylvania, 81; Dr. Charles P. Berkey, New York, 80; Dr. L. C. Glenn, Tennessee, 76; and Dr. H. Ries, of Ithaca, New York, 76. Of these, Willis, Tyrrell, Lawson and Lane have each been Fellows of the Society for 58 years. Tyrrell and Lawson are both former members of the staff of the Geological Survey of Canada. Dr. Tyrrell is an Honorary President of The Canadian Geographical Society.

The Annual Dinner was held the following evening in the Ballroom of the Chateau. Their Excellencies, the Governor-General of Canada and the Viscountess Alexander of Tunis, honoured the Society by their presence. Following the toast to His Majesty proposed

Their Excellencies, the Governor-General and the Viscountess Alexander of Tunis, with the president of the Society, Dean A. I. Levorsen at the annual dinner.

Some of the scientists present at the meetings. Left to right, front row: Bailey Willis, J. B. Tyrrell, A. C. Lawson, A. C. Lane, C. P. Berkey. Back row: W. H. Hobbs, G. H. Ashley, A. I. Levorsen, Henry Ries.

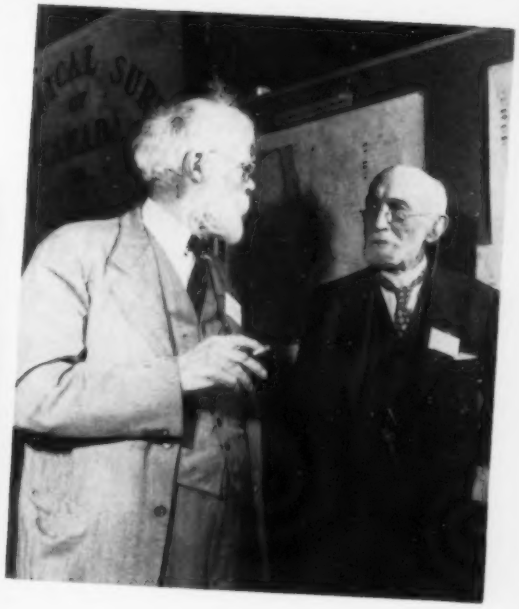
by President Levorsen, His Excellency proposed a toast to the President of the United States. The Penrose medal of the Society was presented in absentia to Dr. Arthur L. Day, formerly director of the Geophysical Laboratory, Carnegie Institution, Washington, for his outstanding researches in physical phenomena at very high and very low temperatures. The recently organized Geological Association of Canada was welcomed by President Levorsen and its president, Dr. J. Willis Ambrose, responded. Toasts were proposed to the Geological Survey of Great Britain, to the Geological Survey of the United States and to the Geological Survey of Canada. Among the speakers were two distinguished British scientists, Dr. H. H. Read of the College of Science and Technology, London, and Dr. Francis Hemming, Secretary of the International Committee on Zoological Nomenclature. The dinner was followed by dancing.

An important feature of the meetings were the exhibits which attracted a great deal of attention. These included illustrations of the Hawaiian submarine canyons, engineering implications of the Massena-Cornwall earthquake, specimens and other materials from areas of interest to the Institute Tennessee Valley Authority, publications of the Society showing coverage of all fields of geology, maps and publications of the Geological Survey of Canada, and Canadian aerial photographs showing features of geological interest.

F. J. Alcock

Among those attending the joint meeting

Right:—A. C. Lawson and A. C. Lane



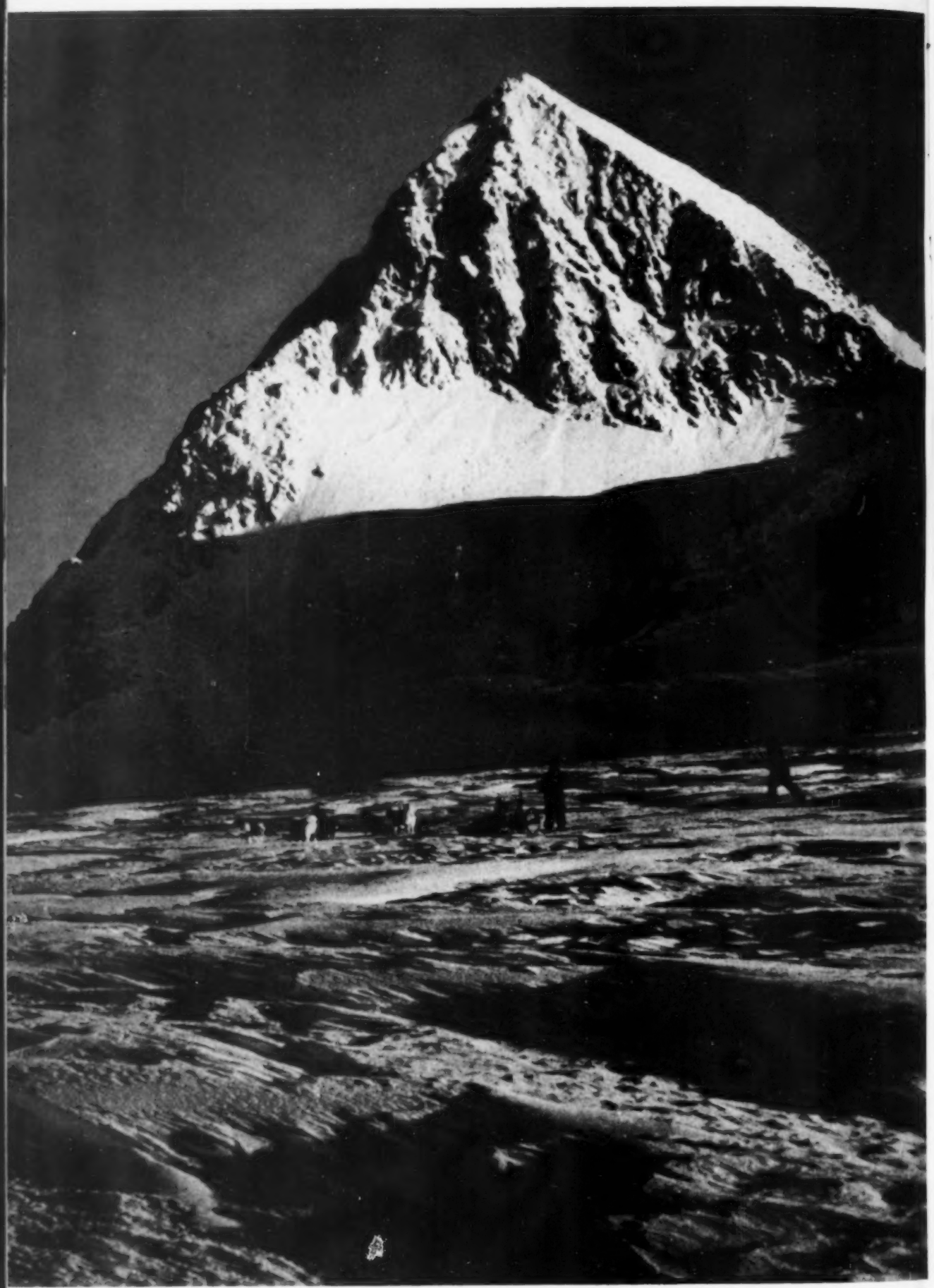
Above:—G. H. Ashley, Bailey Willis, W. H. Hobbs, L. C. Glenn

Newton Studios photo

Right:—The Governor-General and the Viscountess Alexander of Tunis, with Mrs. Eleanora Bliss Knop, distinguished American geologist.

Above:—J. B. Tyrrell, Hon. J. A. Glen, A. C. Lawson

Right:—James Gilluly (incoming president), Bailey Willis, H. Ries



The Antarctic in World Affairs

by HARRY R. LILLIE

British Official Photographs except those taken by the author

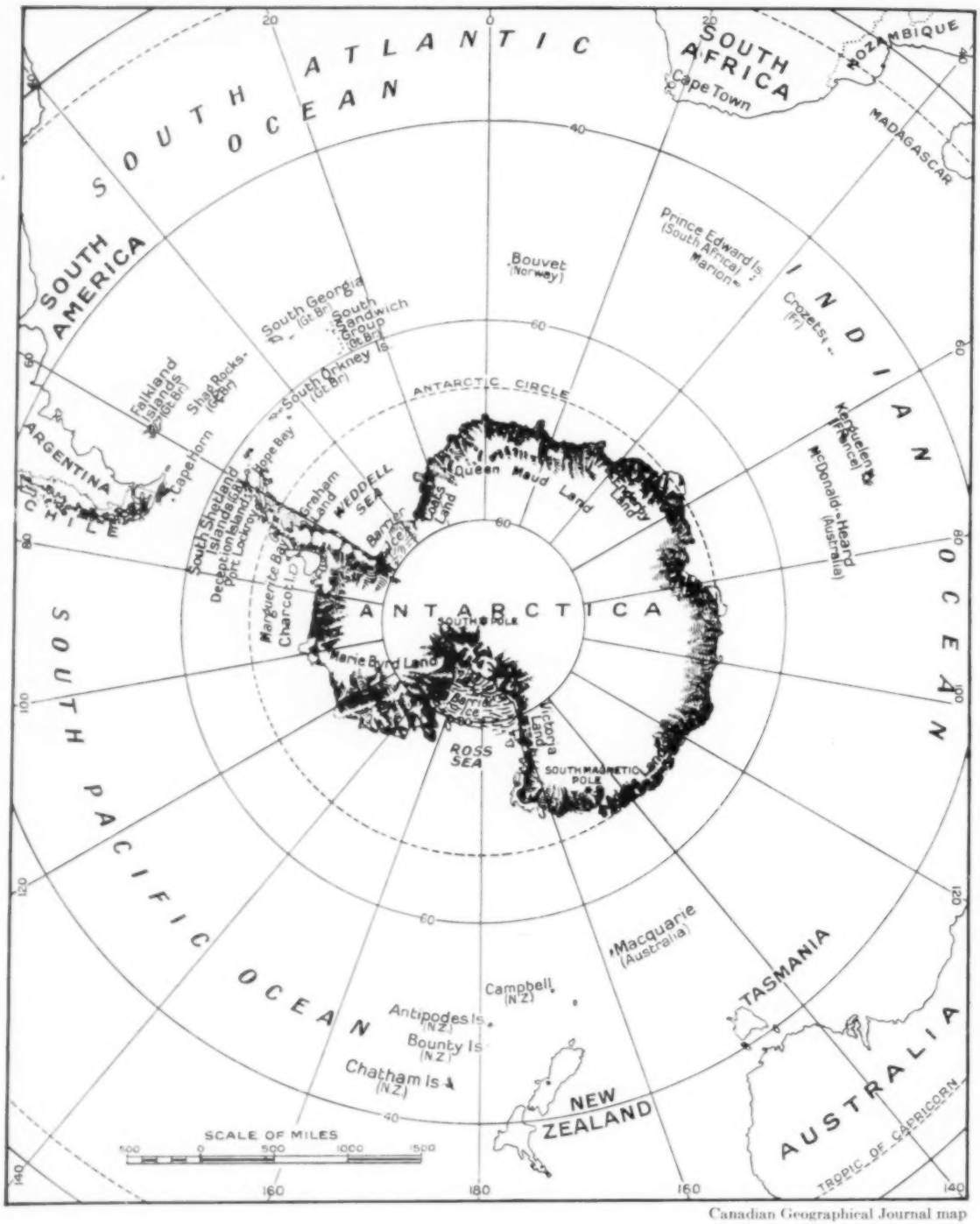
THE ANTARCTIC CONTINENT, the great land mass at the South Pole of the globe, was discovered by Edward Bransfield of the Royal Navy in 1820, when he sighted what is now Trinity Peninsula in Graham Land. It is, broadly speaking, a vast blizzard-ridden plateau the size of Canada, projecting 10,000 feet above the sea, in contrast to the North Polar regions, where the earth's crust is 10,000 feet below the ocean. In the summer months, when whalers operate from December to April along the shifting edge of the pack ice, temperatures are often above freezing and the scene is one of real beauty, indescribably lovely ice colourings by day, and flaming dawns and sunsets, blotted out frequently by days of fog and occasional gales, but enhanced the more from the contrast. But in the winter night blizzards drive almost continuously over a land locked in ice, while farther out towards the open sea heavy pack ice writhes in a tortured mass round gigantic bergs; a land where it is difficult to understand how any creature could remain alive. Yet to the Weddell seals deep in the crevasses of the glaciers, and to the Emperor penguins, the species living farthest south of all, it is home.

This gloriously untamable land, where the squabbles of human nations and the moves in power politics are of less consequence than the little arguments that go on in the penguin colonies, has attracted many great human figures since it was first discovered, culminating in Amundsen's great trek to the Pole itself in 1911, followed closely by Scott.

Left:—Pyramid Peak, Hope Bay, Graham Land. The dog team is used for laying stores depots for the use of surveying parties making expeditions into unknown territory.

At top:—Fin whales being chased in the Weddell Sea. Their speed when running hard is nearly fifteen knots.

Photograph by the author



Canadian Geographical Journal map

A land where man's perspective is quickly and smoothly straightened after the warpings of civilization, or if too brittle to stand manipulation, just breaks.

Various countries have followed south since Bransfield's time and today Norway has given the name to Queen Maud Land in the vicinity of the Greenwich meridian; Australia is interested in the sector Victoria Land to Enderby Land, so much associated with Sir Douglas Mawson, lying between 50° and 160° east longitude, and interrupted

by Adelie Land, a small dependency of France in the vicinity of 140° east longitude. France is associated also with the Graham Land area, through her great explorer Dr. Charcot. New Zealand is interested mainly in the Ross Dependency, around 180° east longitude.

Tremendous work around most of the coastline of the continent, apart from the Weddell Sea area, has just been completed by expeditions from the United States, under command of Admiral Byrd. But of more than twenty major scientific expeditions, which have in the past wintered in the Antarctic, half were from Great Britain.

It is still unknown whether the main Antarctic continental land mass is really one continent or two separate masses, one the size of Alaska and the Yukon together, connected with the peninsula of Graham Land, and separated from a main continental mass the size of the whole of Canada by a permanent ice channel, stretching from the Ross to the Weddell Seas.

Although the names of Scott and Shackleton are so much associated with the Ross Sea area, and the British Colonial Office Discovery Committee's research ships have been active around the whole Antarctic continental coast line, the only Antarctic area for which Britain is now actively responsible is that of the Falkland Islands Dependencies in the South Atlantic sector, established by letters patent of 1908 and 1917 and subsequent continuous administration. It is an area roughly defined by latitude 50° on the north, and longitudes 20° and 80° west, and comprising in the main, the island groups of South Georgia, South Sandwich, South Orkney, and South Shetland, also Graham Land with areas such as Coates Land bordering the Weddell Sea. Graham Land, as far as is known, forms part of the land mass of the Antarctic Continent.

Whaling has been the main industry carried on in the Antarctic since the early part of the present century, floating factories now working mainly along the shifting edge of the pack ice in the great sector from the Weddell Sea eastwards round to the Ross Sea. The remaining South Pacific sector is a declared sanctuary, respected by all countries which are signatories to the International Whaling Agreement of 5th February, 1948, following the last whaling conference in Washington. Those countries are Australia, Canada, Denmark, France, Iceland, Great Britain, New Zealand, Norway, Soviet Russia, and the United States. This Pacific area, however, was always less frequented on account of less suitable weather, even in summer; neither is it as great a rendezvous of whales as elsewhere in the Antarctic. It is a great satisfaction to all concerned with whaling that under the United States supervision, Japan will at last observe the Convention rules, and cease her past wasteful and destructive whaling methods.

A rough-hewn granite headstone marks the grave of Sir Ernest Shackleton at Grytviken in South Georgia. Photograph by the author

Leith Harbour, base of the Scottish whaling fleets in South Georgia. One of the factory ships is at its moorings and a typical whale-catching vessel approaches. Photograph by the author

Attention was first turned to whaling in the Antarctic when the stock of whales in the Northern Hemisphere had been almost entirely destroyed by commercial greed. The opening phase of the southern operations was by land stations. The Compania Argentina de Pesca at present operating from Grytviken in the island of South Georgia, was the first to develop the industry at the instigation of the Norwegian Captain C. A. Larsen, followed by Norway and Britain from shore stations in both South Georgia and the South Shetlands. Soon afterwards floating factories made their appearance, and in this pelagic whaling these factories, accompanied by their own catching vessels as self contained fleet units, are able to move to any part of the seas where whales are found.

The taking of elephant seals on South Georgia for their oil, by the same Argentine Company, is an excellent example of the value of true conservation. South Georgia is, for sealing, divided into four sections, one quarter each year in rotation being maintained as sanctuary where the seals are not disturbed. In the remainder, surplus bulls only are killed, the cows and calves being protected always. The result is that the elephant seal population, estimated prior to conservation earlier in the century as 100,000, is now considered to be at least doubled. This is a remarkable recovery considering that British and American whaling companies engaged in sealing had, in 1885, almost exterminated these seals. Other islands in the Antarctic have also their quota of elephant seals, notably Kerguelen, Heard, and Macquarie Islands.

The small fur seal, which more resembles a small sea lion, similar to his brother in the far northern Pribilof Islands, and once so plentiful on South Georgia, was virtually exterminated there by the beginning of the nineteenth century after more than a million had been taken. At the beginning of the present century there was no trace of him on South Georgia, and those on the South Shetlands were then being wiped out by the same senseless commercial slaughter. Today, however, following protection by the

Elephant seals asleep on the beach at South Georgia.

A battle-scarred bull elephant seal—twice the weight of an ox. They gather on the beaches with the cows in the breeding season from September to November. Surplus bulls are shot for their oil, the cows and calves being protected. Such conservation has brought considerable improvement of the stock on South Georgia in quality and numbers. Photographs by the author

A rookery of Macaroni penguins on South Georgia. The whalers take many eggs for food but in a colony of over a million birds this has little effect. Photograph by the author

Falkland Islands government, there is at last evidence of progressive recovery of the stock. Oceanography and specimen trawling with a view to establishment of white fisheries based on the Falklands has been part of the work of the Discovery Committee in the years prior to World War II, using the research ship *William Scoresby*, particularly in the areas of shallower water close to the Falkland Islands themselves. Results have been very promising.

The Falkland Islands Dependencies, since the Antarctic was first discovered at the beginning of the last century, have been the scene of continued survey and research, intensified in the present century. From 1910 onwards, Graham Land and the South Shetlands had annual summer visits, and Sir Hubert Wilkins visited Graham Land by plane in 1928. Up to 1939, research was under the Discovery Committee section of the Colonial Office. The terms of the Committee confined its activities to oceanography and coastline mapping, primarily to furnish information for the whaling industry. Its research ships, *Discovery*, *William Scoresby*, and *Discovery II* surveyed the areas of the South Sandwich, South Orkney, and South Shetland groups from 1926 to 1939, the greatest oceanographic work ever done.

Then an accurate map of Graham Land became a necessity, and a beginning was made on the west coast of the peninsula by the formation of the British Graham Land Expedition, under J. R. Rymill, which wintered there from 1934 to 1937*. This did not come into the work of the Discovery Committee, being concerned primarily with the land. World War II interrupted progress, but in 1943-44 work was resumed by the Falkland Islands Dependencies Survey, under control of the Colonial Office, with the objects, in addition to the mapping, of setting up wireless meteorological stations and carrying out an economic survey.

The first base was established at Deception Island in the South Shetlands, once the great whaling base of the 1910-30 period, and a second base at Port Lockroy on the northern section of the west coast of Graham Land. *William Scoresby* (now H.M.S.) accompanied by the larger store ship *Fitzroy*, started the expedition, which was under the leadership of Lt.-Cmdr. J. W. S. Marr, R.N.V.R., who had his baptism of the Antarctic with Shackleton in the 1921 Quest expedition. Considerable progress was made, and in the second year Marr was relieved by his second in command, Captain A. Taylor of the Royal Canadian Engineers, and the parties at Port Lockroy and Deception Island were relieved. At Hope Bay at the northern tip of the Graham Land peninsula, another base was

*See "Three Antarctic Years", Canadian Geographical Journal, January 1941.

established for the mapping of the east coast of the peninsula. A third ship, *Eagle*, a Newfoundland sealer, was added to the expedition and sledge dogs were brought from Newfoundland.

In the third year 1945, with the end of the war, Surg.-Cmdr. E. W. Bingham, R.N., relieved Captain Taylor, and *Eagle*, following damage sustained in bad weather amongst bergs, was replaced by *Trepassay*, also from Newfoundland. A meteorological station in the South Orkneys was active in February of that year. An Argentine station had already been operating there for many years by agreement with Britain after taking over from an early station set up by the Scotia expedition in 1903. The South Orkneys were originally discovered by Powell and Palmer in 1821.

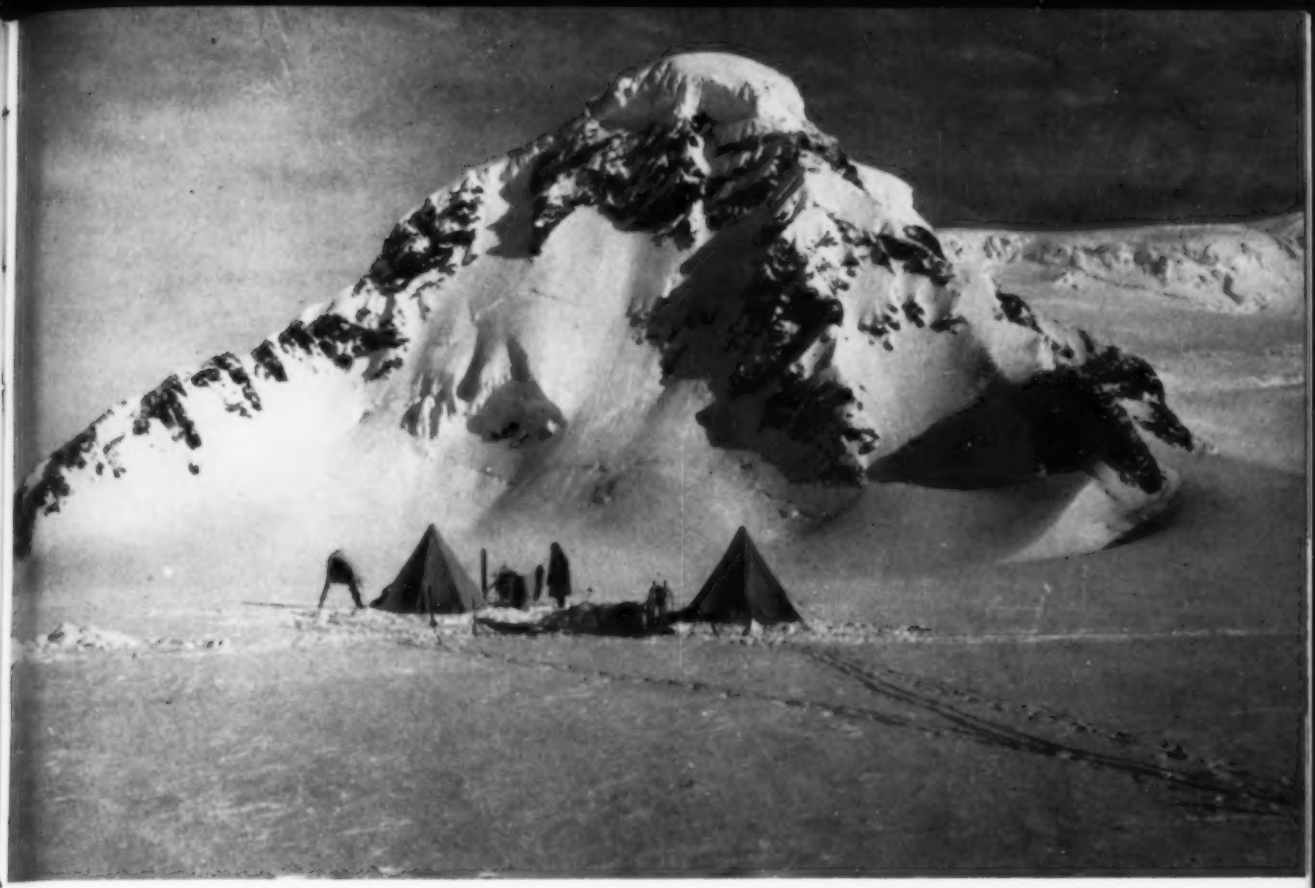
The Survey was now directly under the Colonial Office. As the work progressed southwards a base was required again at Marguerite Bay on the west side of Graham Land close to its junction with the continental land mass, where Rymill had his second base in 1934-37. This was established at Neny Fjord, close to the remains of a United States service expedition base which had been used in the winter of 1940.

Pair of Macaroni penguins. Their nesting season is from November to January. The penguins show great interest in human beings.
Photograph by the author

Penguins coming ashore along the fast ice edge of Hope Bay, Graham Land.

When the boats of a survey party were crushed by ice during a storm, temporary rafts were constructed from available stores.

The living quarters at Port Lockroy, with cloud-encircled Luigi di Savoia mountain in the background.



A survey party in camp on Wiencke Island, Palmer Archipelago.

H.M.S. William Scoresby, *in the pack ice off Wiencke Island, with Lien Island ahead.*

South Georgia on an autumn afternoon, showing Leith Harbour glacier in the distance.
Photograph by the author

The completion of the next step is the meeting of the parties from Hope Bay and Marguerite Bay working towards each other. Meanwhile the meteorological stations provide valuable data for weather forecasting, Antarctic conditions profoundly influencing the weather over a great part of the earth.

A relief party again was sent out from England in *Trepassay* with *Fitzroy*, in December 1946, and another vessel, *John Biscoe*, followed in December 1947. The program continues. It is a Commonwealth operation, the expedition staffs including men from Australia, Canada, New Zealand, Rhodesia, and South Africa, as well as those from the Falkland Islands and Great Britain. The crews of *Eagle* and *Trepassay* have been mainly Newfoundlanders. The Discovery Committee, and the Scott Polar Research Institute at Cambridge, England, closely co-operate.

Various other countries show spasmodic interest in the Falkland Islands Dependencies but, apart from the Argentine, have contributed practically nothing towards development. Occasional little arguments

Scenes of the Falkland Islands Dependencies' Survey. Outside the post office at Port Lockroy, Palmer Archipelago.

Interior of the scientific laboratory at Hope Bay. Here work is carried out on geological specimens and fossils.

A typical whale-catching vessel leaving South Georgia for the whaling grounds 700 miles southeast. Photograph by the author

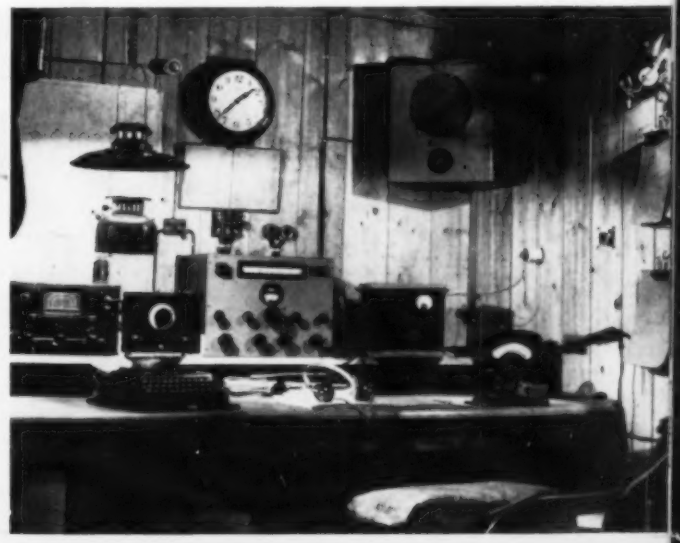
crop up, especially during the more pleasant summer months, as to who really owns what; but there is room for all, and when the real winter weather returns, the differences are blown away with the first blizzard, when the Antarctic does not seem quite such a desirable place after all.

No evidence of radio-active minerals, such as uranium, has appeared on land so far; but at sea, in one sector of the Antarctic, during the whaling season 1946-47, a phenomenon highly suggestive of radio-activity was encountered. This is being further investigated, with a view to closer study of the land mass nearest the location in question.

Further recent expeditions complete the British picture in the Antarctic. South Africa has recently put scientific parties on Prince Edward and Marion Islands, midway between Madagascar and the Antarctic continent. Australia in the past year, began research work on Heard Island, in the mid Indian Ocean sector one thousand miles north of the Antarctic coast line and close to the island of Kerguelen. Here meteor-

Taking a reading from the tide machine erected on sea ice. Readings show the rise and fall of the tides beneath the ice.

Wireless room at Port Lockroy from which Antarctic weather reports and forecasts are broadcast twice daily.



An Antarctic igloo—sometimes built by surveying parties for shelter.

ological observations will be in co-operation with those from Campbell Island, and the station on Macquarie Island, in the New Zealand Tasmania sector, set up many years ago by Sir Douglas Mawson.

This vast Antarctic continent with its island outposts, the grave of many great men, a land of indescribable loveliness and awful blizzards, is possibly rich in coal and minerals. But will it ever call for development by humans ? That is doubtful. A great natural refrigerator, it has even been suggested as an international world storage house for grain and other food-stuffs against times of famine. Meanwhile, the hunting of whales goes on as the most important industry, and with it research to find out more about the habits of these amazing creatures, and how best the stocks can be conserved, and how soon the excessive cruelty involved in the present obsolete wasteful methods can be replaced by their taking by humane economical means.

And through the years the penguins have their brief little territorial squabbles in the rookeries, and always reach agreement in the end; while the seals, deep in the crevasses, tell each other stories in the long winter nights while the blizzards rage overhead, as they did down the ages before men appeared on the earth. While this man animal is busy being successful and making his fellow creatures miserable in the process, the creatures of that "Great White South" loaf their way through life in happiness. And when man at last reaches true humility, having explored the stars, he will realize how much room there is for everyone, and that to look at a snow crystal through a microscope is as great a conquest as any.

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A survey party on Vortex Island, Graham Land, securing their boats

One of the relief ships, S.S. Eagle, *refuelling from an oil barge at Deception Island. The birds dotting the water are Pintado petrels.*

Those Thatched Roofs

by J. D. U. WARD

. . . I am but a poore man, sythe I cannot tyle my house, I must be fayne to thacke it.

THUS, in the year 1530, wrote a man named Palsgrave. More than 400 years later thatched roofs are admired, and contribute much to that old world beauty for which the villages and countryside of southern England are famous. Indeed, in recent years there has been grave concern about the shortage of thatchers, and now the British Government is sponsoring a scheme for training more men. It has been estimated that one county alone (Devon) needs an additional thirty full-time thatchers for immediate maintenance and repair work. Most other counties famous for thatch (principally Norfolk, Wiltshire and Dorset though thatch is quite common throughout the southern half of England) are also short of thatchers.

Practical people sometimes wonder that so primitive a type of roofing, held in some contempt as long ago as 1530, should have survived. Yet not only does thatch survive but it was growing in favour before the war. There were certainly more new roofs thatched between 1925 and 1940 than between 1900 and 1915.

What are the special merits of thatch? First, there is its appearance. It is comely, and a pride to its owner. Second, in certain

At top:—West of England thatch in the village of Selworthy. Dunkery Beacon on Exmoor is in the background.

areas the cost of thatch compares favourably with that of any other good roof, and thatch may even be the only good roof which the walls and roof timbers of some old cottages could safely support. Third, a thatch roof, being fourteen to eighteen inches thick, forms a good insulator, keeping out the cold in winter and the heat in summer.

Fire hazards have been greatly reduced by improved modern methods of treating thatch with chemicals. In the past the risk of fire was so great that thatch was forbidden in most cities (in London it was prohibited as early as 1212) and some rural by-laws required that it should be whitewashed—whitewash making it less inflammable. Also, special hooks with very long handles were kept so that the thatch might be pulled off if it were set alight.

Roofs were not originally thatched, as so many are today, for aesthetic reasons but rather of necessity, for lack of any other available means by which the weather might be excluded. Early thatch probably consisted of rushes laid on a foundation of brushwood; this brushwood was superseded by wattle (Bede mentions the burning of a wattle and thatch roof in the year A.D. 642!) and later from wattle was developed a crude likeness of a modern roof frame.

A Berkshire inn, The Barley Mow at Clifton Hampden.

"Thatch" itself probably comes from an old Saxon word meaning to cover, and it is known that the early missionaries roofed their churches—and later cathedrals also—with thatch. In those days not only dwelling houses but also many walls of yards were commonly built of cob (that is, mud and straw, raised in layers, each of which was allowed to dry before the next was imposed) and many of these walls were thatched, because, though otherwise sound, they could not withstand the English rain unless they were protected from above. There still survive in England thatched cob walls which are believed by experts to date from Saxon times—more than 1,250 years ago.

As England grew in wealth and other roofing materials became available to more people, thatched roofs declined in favour, and were used only by those householders who could afford nothing better. Great churches were roofed with lead, and important houses, though originally thatched (as certain details of outline inform the knowledgeable student), were re-roofed with stones, slates or tiles. The feeling that

Cottage at Drayton, Oxfordshire.

Thatched Methodist chapel in Cornwall. The upper part of the walls are of cob.

The chapel-of-ease at Tivington. The [illegible] *cottag* [illegible]

thatch was a sign of pitiful or shameful poverty reached its height in the nineteenth century, when nearly all thatched churches, except those in Norfolk and Suffolk, had their thatch replaced by other kinds of roofing.

So strong and so ridiculous was the feeling of thatch's unworthiness that one parish which could not afford a whole new roof had the road side of its church tiled, while the side which could not be seen by the general public retained its old roof of humble thatch! It is, however, pleasant to record that between fifty and sixty parish churches in Norfolk still have thatched roofs (compared with 270 having such roofs 130 years ago) and seventeen parish churches in Suffolk have thatched roofs. A modern church, about 35 years old, in the Isle of Wight is the only thatched parish church known to the writer in any other part of England.

In the southwestern counties there survive a number of thatched meeting houses and free church chapels. Among the most interesting is the Congregational meeting house at Horningsham* whose lease still contains the original and now unnecessary stipulation that the fine thatched roof should be renewed every eight years. There is also the little Quaker meeting house in the hamlet of Come-to-Good, near Truro, in Cornwall. This was built of cob in the year 1710 when it cost £69. The curious name is probably a corruption of Cwm-te-coit, the valley in the wood.

Many chapels in Cornwall have thatched roofs and in the same county, which knows the full force of the Atlantic gales, one may sometimes see the thatched roofs of fishermen's cottages secured by old fishing nets with boulders attached to weigh them down. Deserving special mention is a fifteenth

* See Canadian Geographical Journal, July 1944, p. 36.

An ancient thatched cob wall at Dorchester, Oxfordshire. The thatched barn with dormer has since been demolished.

cottage (left part of the building) is

The Quaker meeting house of Come-to-Good in Cornwall. The thatched extension is to shelter the worshippers' vehicles.

century Anglican chapel-of-ease at Tivington in West Somerset, which is remarkable for having a humble lodging for a priest adjoined, all under the same thatched roof.

There are many kinds of thatch: even straw thatch may be divided into at least four or five categories. The best is made with wheat straw from which the ears have been cut so that the straw has never been damaged by threshing; this straw is often called "reed". Next there is thatch made of wheat straw which has suffered some damage from threshing but has been specially selected and combed. Inferior, uncombed straw is also used, despite the fact that the resultant thatch will probably need renewal within five or six years.

There are the different methods of laying straw thatch. In some counties the "long straw" style prevails. The thatcher displays the length of his straw and plucks away all loose ends by hand. Elsewhere there is the "short straw" style, for which the straw is differently laid, and which is finished with shears or knife, so that the final result is bristly in appearance.

Also common, especially in the New Forest, is the "top and tail" method, which looks picturesque since some of the ears point downwards and make the surface "pretty-pretty" but which does not wear well. In some Dorset villages may be found "spear thatch" made of very coarse reeds grown locally.

Best of all thatches is the true "Norfolk reed", made of the long reeds grown on the broads or shallow lakes of Norfolk and Suffolk. Roofs of Norfolk reed, though belonging most properly to Norfolk and Suffolk, may be seen in many distant parts of England, for most people who want a thatched roof prefer one of Norfolk reed if they can afford it.

The Waggon and Horses, a Dickens inn at Beckhampton, Wiltshire.

A thatcher and his assistant at work on a long expanse of thatch in Berkshire.

A Devonshire thatcher at work. This roof cost less than $5 per square.

Anne Hathaway's Cottage at Shottery, Stratford-on-Avon. Anne married Shakespeare in 1582 and the cottage remained in the Hathaway family until 1838. It is now a show place.

What are the costs of thatching? They vary widely, sometimes by 200 per cent within a distance of 20 miles! Norfolk reed thatch may cost between $20 and $40 a square—which means 100 square feet. The various kinds of straw thatch may be as cheap as $2 per square or as expensive as $20. The writer has seen excellent new straw thatching done in Devonshire for under $5. Upkeep and renewal costs also vary widely, and it is a fact that the most economical kinds of thatch, assessed on a 25 or 50 year basis, are those which cost most in the initial outlay. For example, the best straw thatch will last 25 to 30 years, but the "cheapest" and worst will need renewal in five or six years. The best Norfolk reed will last up to 60 years.

Fifty years ago straw thatch cost no more than $3 a square anywhere in England, but about 1901 agricultural depression forced the price down to little more than $1, and many thatchers had to seek new trades. More recently the pendulum has swung well the other way. Some twelve years ago, when chatting to an old straw-thatcher in Berkshire, the writer asked why he worked only three or at most four days a week. He replied that his was piece-work and it was not good policy to work a full week thatching in one place. A gentleman might have several good directorships and a large income, but he would not think it right to pay a working man much over £5 for a week's work!

Four years later, when talking to a thatcher in Devonshire, the writer was told that many of the Norfolk reed-thatchers worked only three or four days each week. Chatting thus to friendly thatchers, a man may learn much about their craft. For example, straw grown in a dry season makes better thatch than any grown in a wet season. Again, it is widely held that the

quality of straw has been impaired by the use of more artificial manures and less farmyard dung than in the old days.

Now there are not enough thatchers to maintain the thatched roofs of England and to put straw or reed over those new-built houses whose owners desire the old-style roof. In 1938 there were about 400 thatchers working in straw, and about 130 working in Norfolk reed. The tendency was for such learners and apprentices as there were to leave the trade, which they found too lonely for their taste. In consequence a very large proportion of thatchers are elderly men—the average age is over fifty years—which naturally means that the wastage from death is considerable.

In these circumstances there is a real danger, if the present move to train more thatchers is not successful, that the demand for thatched roofs on new houses may be met by various kinds of spurious substitutes, or synthetic thatch made by machines in factories. Meantime, more and more ancient cottages will have their traditional thatch replaced by roofs of corrugated galvanized iron which, although it has the merits of cheapness and lightness, has no insulating properties and is an eyesore to all who pass by. Next to new recruits bringing young and vigorous blood into the old business, thatchers most need a supply of straw-combing machines. It is easy to see that, if a roof made of combed straw which has never been threshed will last 25 years, against an average of 10 years for a roof of threshed straw, the combing machines will enable any given number of thatchers to maintain twice as many roofs.

Conditions are now ripe in England for a real revival in the very ancient and primitive craft of thatching—a craft once held in such esteem that King John was pleased to boast himself a good thatcher.

Norfolk reed thatch on a modern building. The Ovaltine model dairy farm.

EDITOR'S NOTE-BOOK

For biographical sketch of Robert J. C. Stead see April 1948 issue.

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Harry R. Lillie, M.B., Ch.B., B.Sc., A.M.I.C.E., who has recently been lecturing in Canada, comes from Dundee, Scotland. For some years Dr. Lillie was a practising civil engineer before he returned to the university to qualify as a surgeon. During the war he served with the navy in combined operations in the Atlantic, Pacific and the Mediterranean. In 1946-47 Dr. Lillie was in the Antarctic as surgeon to one of the Scottish whaling fleets. He is much interested in research into humanitarian methods of whaling.

* * *

Readers of Mr. Butler's article about the Geological Survey and Museum of London may be interested to know that the eighteenth session of the International Geological Congress is to be held from August 25th to September 1st this year, in London, with headquarters in the building of the Geological Survey and Museum.

* * *

F. J. Alcock, Ph.D., B.A., for many years a member of the staff of the Geological Survey of Canada, is now Curator of the National Museum.

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COVER SUBJECT:

WOOD THRUSH
by W. V. Crich

Hylocichla Mustelina (Gk. *hyle* wood + *kichle* thrush, Lat. *mustelina* pertaining to a weasel (colour))

The large rounded black spots on the pure white breast, and the large black eye, make the best field-marks of the Wood Thrush. Its size is between that of the robin and that of the bluebird.

It breeds from southern South Dakota, central Minnesota, central Wisconsin, southeastern Ontario, central New Hampshire, and southern Maine south to eastern Texas, Louisiana, southern Alabama and northern Florida. It winters from southern Mexico to western Panama.

Knowledge of bird habits is essential if one is to be successful in finding their nests. Woodland birds usually select the margins of woods for nesting, and seldom the depths of woods. Knowing this characteristic, I looked for my Wood Thrush along an abandoned road leading through a typical Wood Thrush habitat. Tall grass grew up between old wagon ruts; there were no houses in view, no signs of human habitation. Leaving my car beneath a spreading maple tree, I took my field glasses and, approaching the woods, flushed my Wood Thrush. About twenty-five feet away where a culvert crossed the road, cutting a mosquito-ridden, stagnant pond, I located its nest, ornamented by bits of bleached leaves from the forest floor, cradling a young family well advanced. I was in luck. I should be able to obtain a choice of selective poses as the parent birds fed their young.

To obtain my photographs, it was necessary to build a blind. This consisted of an old beach umbrella with eyelets fastened around the perimeter of its top. From these eyelets was hung, by means of hooks, a surrounding wall of brown sacking. The camera and blind were set up in front of the nest. Seated inside on a camp stool, I waited, alert for a characteristic pose: the photograph reproduced on the front cover of this Journal is my choice.

I have observed Wood Thrushes—these beautiful olive-brown birds with the large black spots on a white breast—pursue their daily tasks from the time the ardent males twist and turn after the equally ardent but "playing-hard-to-get" females, until, silent and retiring, they slip away to their winter homes.

To hear a number of these birds is like listening to an orchestra of celestial flutes, and their music to me is unexcelled by any of our native birds. Their habitat is cool woodlands, with rank maiden-hair fern, ground hemlock and swamp maples. Like the Robin, another member of the thrush family, the Wood Thrush builds its nest from 5 to 40 feet above the ground, of mud, leaf-mould and dried leaves, lined with tiny rootlets. The eggs (3 to 5) are greenish blue.

* * *

AMONGST THE NEW BOOKS

Fundamentals of Earth Science
by Henry Dewey Thompson
(D. Appleton-Century Company, New York, N.Y., $3.75)

The author is Associate Professor and Chairman of the Department of Geology and Geography in Hunter College of the City of New York. He presents a volume that will serve equally well as an elementary text for a college student taking a first course in earth science or as a book for the general reader interested in matters concerning our earth. It is well written and arranged, concise, the material excellently chosen and presented in an interesting manner. For those who wish to pursue any particular subject further there is a list of suggestions at the end of each chapter.

As its name suggests the book is concerned with Earth Science in a broad way. It covers the elements of both geology and meteorology and forms a basis for later more specialized courses in various branches of these subjects or for work in economic or regional geography. It includes a brief discussion of maps, map projection, diagrams, and the use and importance of photographs. The diagrams used are excellent and of great value. The photographs are well chosen but unfortunately many are not as clearly reproduced as they might be.

F.J.A.

AN ANNOUNCEMENT

IT is with pleasure and pride that The Canadian Geographical Society announces publication of its new Provincial Geographical Aspects booklets. Printed on the same quality paper and page size as the "Journal" the set comprises nine booklets, each presenting in graphic form the varied geographical aspects of one Canadian province. Each booklet contains 32 pages, is profusely illustrated and has a map of the province. The subject is treated in comprehensive manner, touching on historical, physical, economic and human aspects of the province, with sections on topography, climate, natural resources, industries, cities, etc. Leading authorities in every field have collaborated in preparation of the articles and the result is a concise, reliable, up-to-date survey of Canada from coast to coast. In order to be of maximum usefulness the booklets are written in simple language within the range of school children.

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AMONGST THE NEW BOOKS

The Pompous Parrot, and Other West Indian Tales
by DAPHNE TAYLOR
illustrated by Nan Richards.
(Macmillan, Toronto, $2.25)

AN absolutely delightful and original book for children written and illustrated by two young Trinidad mothers. In quarto size in large clear type and with many full-page line-drawings of exceptional charm, this collection of fables and tales is rich in folk-lore and tropical colour. These stories tell of many plants and animals new and entrancingly exotic to young northerners. Not only is there the Pompous Parrot, but there are monkeys, pelicans, humming-birds, cornbirds and dragon-flies; alligators, mongoose and agouti; mango and breadfruit trees, and the lovely immortelles and pouis; West Indian fairy folk—mischievous dwens and the good sprites; and quaint West Indian people.

There can be no doubt that children like to think that animals can talk and have no objection, even, to their doing a bit of moralizing. There is many a chuckle in store for them among these wise and witty birds and animals and the good and bad sprites. Some new characters appear in familiar fables; the story of the hare and the tortoise becomes a race between the crab and the turtle, but one has only to scan the titles—of which a few are The Magic Mango, The Sprites of the Coconut and The Discontented Crab—to realize that these tales are as refreshingly different as the birds and animals of which they tell differ from our northern ones.

F. E. FORSEY

* * *

The New North-West
by C. A. DAWSON, Editor
(University of Toronto, Toronto, $4.25)

This study of the Northwest Territories and Yukon consists of a series of chapters, each written by a specialist in the field dealt with; these are: administration, mining, fur, agriculture, transportation, public health, education, and so on. There is a good bibliography and an adequate index. The text is, as one might expect, authoritative and there are graphs and diagrams to illustrate statistical information. One could wish that these had been a little bolder in drawing and lettering, for they are sometimes difficult to read. Apparently they have been reduced from larger originals in which the lettering and drawing was done with lines too narrow to stand reduction.

The great changes which have taken place in the north of Canada are vividly clear. Comparison of this volume with Finnie's *Lure of the North* or *Canada Moves North*, both less than ten years old, makes these changes very evident. That even greater changes are yet to come can hardly be doubted.

DOUGLAS LEECHMAN